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a human head. They usually enclose a cavity, the walls of which are studded with crystals of one, and often of several minerals, frequently presenting great beauty of appearance. The former of these (No. 1) is abundant in the Niagara limestone of the New York State Survey; while the latter (No. 2) occurs in profusion in the limestones of Indiana, Missouri, and other portions of the Mississippi Valley.

The two objects above described, though so utterly unlike, are without any distinction called *geodes* by geological writers. And why?

That the two objects, so essentially different, should be known by distinctive names seems wholly self-evident. The present usage of writers in coupling both under one and the same name, as they constantly do, is productive of extreme confusion, while the practice is not justified by any apparent necessity whatever.—R. W. HASKINS, *Buffalo, N. Y.*

PROCEEDINGS OF SCIENTIFIC SOCIETIES.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—NATURAL HISTORY SECTION. *Chicago, Ill., August* 5–12, 1868. Gen. G. K. WARREN presented a paper "On certain Physical Features of the Upper Mississippi River." He had been detailed to survey the Upper Mississippi, Minnesota, and Wisconsin rivers, with a view to improving the navigation and constructing bridges which should afford the least obstruction to navigation practicable; in doing this he has reached results, which, besides being important to the objects for which they had been sought, were believed to be of general scientific interest. He had been early impressed by the immense excavations made in the Silurian rocks through which these rivers now flow. This great excavation above the junction of the Minnesota and Mississippi rivers, is occupied, not by the Mississippi river but by the Minnesota river. The bed of this latter, however, for about one hundred and ten miles below Big Stone lake, is partially granitic. Big Stone lake occupies thirty miles of this great excavation, and Lac Travers about twenty. The two lakes are separated by a strip of low land, but a few feet above their level, and about nine hundred and eighty feet above the ocean level. This is a deposit made by the infant Minnesota river as it enters this great excavation, and during heavy rains the streams send their waters to Hudson Bay as well as the Gulf of Mexico. The great excavated valley of which we have been speaking, is at this point about a mile wide, and the bluffs, or sides, composed of bowlders and gravel, are about one hundred and fifty feet high. Were one inclined to believe that the present streams in a long period of time would be sufficient to excavate the valley of the Mississippi, he must admit their insufficiency here. In fact these feeble streams, so far from having made this great excavation, are doing their best to fill it up.

Northward from Lac Travers commences a vast lake basin extending continuously to the north end of Lake Winnipeg, including this lake, Lake Winnipigoos and Lake Manitoba. The greater part of this ancient lake-bed is now dry, leaving a well-defined beach to mark its former extent. Although the Red river of the north flows north along the lowest line of this bed, he concluded that the waters of this basin once flowed southward, through the Minnesota river, into the Mississippi.

The present level of Lake Winnipeg, according to Mr. Hines, is six hundred and fifty feet above the ocean. To cause the waters to flow southward again, with the present levels of the land existing, would require the lake to be raised three hundred and thirty feet. It is obvious this could not be done while the Nelson river outlet existed. There is no good description of this outlet, as it is never used for a line of communication; it abounds in rapids and falls, which seem to show its recent origin. If we suppose the ice of the glacial period to have closed this, it would have given the lake the whole extent of the basin, and caused its discharge southward; but this will not account for all the phenomena observed.

A more satisfactory explanation of a change of outlet from a southern to a northern one, is to attribute it to a northern depression of the basin; for it is found that Lake Michigan formerly had a southern outlet through the Illinois river, and Lake Winnebago also had a much greater extent and a southern outlet. The shores of all the lakes show the water to be receding from their southern ends and encroaching upon the northern. This northern depression is known to be going on along the Atlantic coast from New Jersey to Greenland.

Gen. Warren said that further consideration had shown him that all the waters of Winnipeg basin, even if they had continued to flow southward could not have excavated the passage-way now occupied by the Minnesota and Mississippi rivers, and that we must go farther back in time to reach a sufficient cause. In doing this we must first consider the character of the rivers which existed in this region previous to the glacial epoch. During the Cretaceous period we know that an ocean extended from the present Gulf of Mexico to the Arctic Ocean, covering a large portion of the space between the Missouri and Rocky Mountains. At that time the upper country through which the Mississippi now flows was dry land, and its slopes must have sent its waters westward to the Cretaceous ocean. As the continent rose this Cretaceous ocean disappeared, and the Tertiary period began with great fresh-water lakes along the base of the Rocky Mountains; into these lakes the waters of the Upper Mississippi region continued to drain westward. The gradual south-western elevation of the continent throughout the Tertiary period is distinctly proved by the deposits of these Tertiary lakes. The earlier deposits were of least area, and as they become more recent they expand north-eastward, and this continued apparently to the time preceding the glacial epoch. This elevation at the south-west seems to have been in progress from the earliest geological epoch; every contemporaneous formation being found in the mountain regions of the south-west higher than to the north-east.

Preceding the glacial period, then, all the water-courses of the Upper Mississippi region were westward, and not southward as now. Not only the slope of the land, but the great folds of the Silurian strata compelled the water to take this course. Over a great deal of the region thus drained, no rocks more recent than the Silurian are found, so that it must have been dry land since the Silurian period. In the immense ages succeeding, this dry land was exposed to all the atmospheric influences, and we can conceive how it must have been cut up by ravines and valleys encroaching on each other in endless confusion, as we now see in the bad lands of Nebraska. Even the hard azoic rocks forming the dry land of the Silurian period must have exhibited the most stupendous atmospheric erosions. These preglacial erosions can still be distinguished from those more recent. When, then, the glaciers came it would seem that their work was easy, and they have planed down the whole region, removing Silurian slata several hundred feet in thickness, over hundreds of miles. The whole Upper Mississippi region was the scene of the drift action, and the valleys of preëxisting rivers were filled up and mostly buried out of sight. The existence of a distinct glacial moraine at Warsaw, on the Mississippi, shows that the glaciers were at least that far south.

He had determined the south-western limit of the glacial or drift action to be the Missouri river, from about the 48th down to the 43d parallel of latitude. The modified drift forms the grand Coteau du Missouri, lying on its east bank, and this material extends thence north-eastward almost continuously. From the Missouri river to the Rocky Mountains, a distance varying from three hundred to five hundred miles, no drift is found except that due to local glaciers of the mountains, which, in some places, extended for fifty miles east of their bases. The existence of this space between the Missouri river and the Rocky Mountains shows that the form of the continent and seas in the glacial time were such as to produce in the climate relations similar to what now exist: namely, that the mountain region to the west intercepted the moisture as now from that direction, and that the supply for the Mississippi valley came from the south as at present, moved with the winds in a north-easterly direction as now, and left an arid region such as we now have along the plains east of the mountains. Since low temperature and moisture combined are required to produce a glacier, it follows that either high temperature or aridity would arrest their formation. If high temperature limited them southward and aridity westward, the limiting line would have taken a north-west and south-east direction, somewhat as the summer isothermal line does now. The motion of the glacial mass must have been along the line of least resistance, and towards this limiting line, and the glacial scratches in the Upper Mississippi region show that the motion was south-west. There, then, on that limit a river must have formed, to carry away the melting water from the glacier, and this limit was the Missouri river, and that was the river formed thereby. It cut along this glacial limit because all the streams west of it came from the mountains toward it, and there their old course was terminated. We see what lakes must periodically have formed here, what great barriers must have been formed and burst one after another, and what deluges the lower valley must have experienced. When the glaciers began to retire to the north-east, as long as the general slope of the continent was towards the glacial mass, successive rivers were marked out by it along its western face, and all have a parallelism, and are close to each other, and have short tributaries or parallel branches if any. They are, besides minor streams, the James river, the Big Sioux river, the Des Moines river, the Iowa and Cedar rivers, and finally the Minnesota and Mississippi rivers, the last of the parallel series. After the lowest line of the continental valley was passed, the glacier would begin to retire in such manner that the melting water would run directly from it, and such we see is the direction of all the tributaries of the Mississippi on the east side. This direction corresponds with that of the preglacial rivers, and it is probable that some of them, such as the St. Croix river, Chippeway river, Wisconsin river, etc., washed out and regained their old beds, for so their appearance would indicate.

The bend of the great valley along the Minnesota river, between Mankato and St. Paul, being at right angles to the main course of all these parallel glacial rivers, would seem to disprove the view that the formation of this river took place along the glacial margin. But it probably is the bed of one of these preglacial rivers, as it lies in the proper fold of the Silurian rocks and seems to have been formed in an ancient valley. From St. Paul southward, however, the present course of the Mississippi is cut square across this fold in the rocks, and the glacial action is the only explanation of it.

The manner in which the glacial action produced these valleys was not by abrading the strata with the grinding power of rocks embedded in the ice, but after the manner in which a block of marble is sawed. The glacier supplied an immense power in the melting water, and into this water it was constantly dropping sharp rocks and sand.

The waters issuing from a lake have little abrading power, for they have comparatively little rubbing material to operate with. Thus it was that the waters issuing at the old southern outlet of Lake Winnipeg could make no impression on the granitic bed of the Minnesota. Had this material been soft like the Silurian rocks lower down in its course, or like the Tertiary and Cretaceous rocks through which the Missouri has cut its way, then this part of the valley would have been worn away in the same manner, and we should have the drainage of all the Winnipeg basin still to the southward. A cut of four hundred feet at Big Stone lake would have drained it, nor would the banks then have been as high as those of the Missouri, at the Bijou hills, which are eight hundred feet above the water of the river. The slope of the Missouri is more than double that of the Mississippi, and hence the water of the Missouri river is several hundred feet higher than that of the Mississippi, at points in the same latitude in their upper courses. An examination of the bluffs along the Mississippi shows that the space between them is on the whole quite uniform in width, gradually increasing downward, being about a mile at Big Stone lake, and reaching six to ten miles at Commerce; below this the space widens out to from forty to sixty miles. Sometimes the river, as at the "Grand Tower" and at "Le-montagne-qui-trempe ã-l'eau," and several other places, is found flowing between bluffs not even a mile apart; but the bluffs on one side or the other are always found to be a detached mass, and the main valley exists there too.

Two remarkable exceptions to this occur at the rapids,—one at Keokuk, the other at Rock Island. Without lengthening this paper to such an extent as would be necessary to go fully into an explanation of these exceptions, he stated that after being long puzzled by them, he discovered that the whole valley had been covered with an extension of the Gulf since the glacial period as high up as Savannah or Dubuque; that the silt brought in by the Des Moines river in the one case, and by the Iowa and Rock rivers in the other during this period, entirely filled up the bed cut out by the great glacial river, and that when the land rose again, the Mississippi could not at these points regain its old bed. So it had to cut a new one, and this it has not yet completed. The space between the bluffs at these two places has the width the present river requires, and it is so nowhere else in its whole course.

It might be thought that these investigations do not affect the question of improving the navigation of the rivers or bridging them. In removing obstructions we have two kinds to deal with, such as arise from causes not now operating, and which once removed would not recur, and those from causes that are now operating and which must be constantly recurring unless the cause itself is removed. The discussion given forms the bases of a proper discrimination of these causes. The question of bridging the Mississippi keeps in view largely the action of the stream and the character of its bed. The usual argument that the scouring action that has been in operation may take place again, must not be applied here till we can separate the observed effects of such agencies as here treated of from those now at work. Instead of probing with an iron rod every inch of the bed before we can determine the practical depth at which firm rock may be reached, we have here established general conclusions, which settle the question for all points at once. This is illustrated by referring to what took place all along the Mississippi, when the Winnipeg basin ceased to discharge its waters southward. The former river, which bore along all the sediment brought by its tributaries, was gone. Everywhere along its course these tributaries continued to deposit at their mouths the sand and heavy material as before, and there it accumulated till a lake gradually grew above each point of junction. The waters of each lake gradually spread this material down the valley, and encroached upon the lake below it, as a delta advances into any body of water into which a stream flows. These lakes in most cases were thus gradually filled up, leaving countless delta islands in their place, but Lake Pepin still exists made by the sands deposited by the Chippeway. Lac qui Parle and Big Stone lake, on the Minnesota river, are of the same kind. The depth of water in these lakes is still fifty to seventy feet or more, so that having thus accounted for their origin, we have in their depth the least measure of the depth of sand above and below them. There is no need, when we know how this river passage was made, to sound in order to get the depth of the sand. We know the foundation everything must have that crosses the valley of the Mississippi. The exceptional cases at the rapids I have explained.

So far what is said is mainly in the way of a demonstration to account for "Certain Physical Features of the Upper Mississippi river." The grandeur of the subject he had tried to keep from influencing his observation and deductions therefrom. But part of the facts by which the conclusions are reached are here given, nor are all of the inferences drawn which the facts presented will warrant.

He hardly knew how much of what he had said is derived from others. He had consulted some of the most distinguished geologists on the general subject. He was particularly indebted to Mr. James E. Mills of New York, whose investigations of the gradual northern depression going on along the Atlantic coast, suggested to him to account for the change of outlet of Lake Winnipeg in the manner above. He believed his observations in themselves demonstrate this depression to be going on along the great central valley, so that we are authorized to conclude that it probably embraces the whole continent. This must affect all the rivers and all the lakes, bays and oceans around us, and so far as his observation and reading extend, they all give the same proofs of it. It is, however, a field for many observers, and he ventured this incomplete showing, so that others who have the opportunity, and deem it worthy of their efforts, may help along the investigation.

KENT SCIENTIFIC INSTITUTE. *Grand Rapids, Mich., Sept.* 11, 1868.— Mr. A. O. Currier presented a paper for publication, entitled "A List of the Shell-bearing Mollusks of Michigan, particularly of Kent and adjoining counties." The list contains all the species heretofore described, and several new to science, of which descriptions exist only in the manuscript of Mr. Currier.

Mr. George W. Smith gave an account of a series of examinations made of a group of ancient mounds situated four miles below the city, on low ground adjoining the Grand Rapid river. The group consists of thirteen mounds, and is placed upon an area 700 by 400 feet. The mounds vary in height from five feet to over twenty-five, and in diameter from twelve to over sixty feet. They appear to have been constructed on no decided plan, but run promiscuously in a direction nearly east and west. Their character, or that of their builders, are unknown to the present race of

Indians who have inhabited the locality for many generations. Trees three and four feet in diameter lie in a state of extreme decay on many of the mounds, while hardwood trees, quite as large, grow luxuriantly on nearly all of them. Several of the mounds have been explored quite thoroughly. Two vases of pottery, copper and stone implements, bone-needles, and a piece of wicker work, very unique, and probably intended for a basket, were found. The latter was too far gone to be saved. Pieces of flint were also seen strewed in one mound. The vases of pottery rested on a hard loam foundation, a few feet square, and in both cases on a level with the ground. Layers of ashes and burned earth appeared frequently in the excavations. The builders, probably, belonged to the race whose monuments are so numerous farther south.

ANSWERS TO CORRESPONDENTS.

P. G. M., New York.—(1) We cannot give the number of known species of Kingfishers in the world. Mr. Cassin, in his catalogue of the specimens of the family contained in the large ornithological collection of the museum of the Philadelphia Academy of Natural Sciences, published in 1852, gives ninety-one species from various parts of the world. (2) We do not know what is meant by Kinghunters. (3) It is well, in order to avoid being led into error, to question much that is given in works of a popular character, unless the statements are taken from a well-known authority on the subject, and even then you must remember that the most noted naturalists have sometimes made statements which farther research has shown not to be true. In general, the work you refer to is as reliable as most compilations.

J. C. C., Notre Dame, Ind.—We have printed labels of the Family and Generic names of the Hymenoptera and Lepidoptera, and are gradually printing those of the other orders of Insects. We also have printed labels of the different States of the Union, and localities in Mexico, Central America, etc., in small type, and abbreviated for pinning under insects. Also blank labels, with a red border, for filling out with a pen. We shall advertise these as soon as we have some others printed, but in the meanwhile we could furnish any of them at a fair price.

E. O., Yellow Springs, O.—We send the names of the beetles remaining unnamed from your collection: 1, *Nebria pallipes* Say; 2, *Chlænius tricolor* Say; 4, *Dicælus purpuratus* Bon.; 5, *Bembidium chalceum* Dej.; 6, *Dicælus teter* Say; 7, *D. sculptilis* Say; 8, *Anomoglossus emarginatus* Say; 9, *Stenolophus ochropezus* Say; 10, *Chlænius rufipes* Dej.; 11, *Pterostichus* (Pœcilus) *lucublandus* Say; 12, *Platynus sinuatus* Dej.; 13, *Clivina bipustulata* Dej.; 14, *Pterostichus* (Omaseus) *mutus* Say; 15, *Bradycellus vulpeculus* Say; 16, *Pterostichus* (Pœcilus) *occidentalis* Dej.; 17, *Helluomorpha laticornis* Dej.; 18, *Anisodactylus nigerrimus* Dej.; 19, *Dacne heros;* 21, *Staphylinus maculosus* Grav.; 22, *S. mysticus* Erich.?; 23. *S. cinnamopterus* Grav.; 24, *Creophilus villosus* Grav.

E. P. A., Milwaukee, Wis.—1, *Geopinus incrassatus* Dej.; 2, *Chlænius sericeus* Forst.; 3, *Pœcilus*, species?; 4, *Calosoma calidum* Fabr.; 6, *Arhopalus fulminans* Fabr.; 7, *Elaphidion mucronatum* Say; 8, *Clytus campestris* Oliv.; 9, *Clytus marginicollis* Laporte; 10, *Physocnemum brevilineum* Say; 11, *Hylobius pales* Herbst; 12, *Sphenophorus* sp.? 13, *Sphenophorus vinercus* Say?. 14, *Balaninus rectus* Say; 15, *Aphodius fimetarius* Linn.; 16, *Dichelonycha* sp.?; 17, *Eumolpus auratus;* 18, *Doryphora* 10-*lineata;* 19, 20, *Mysia* 15-*punctata* Oliv., varieties; 21, *Disonycha pluriligata* Lec.; 23, *Coccinella bipunctata* Linn.; 24, *Phyllobrothica.*

We would like more specimens of those numbered 5, 6, 7, 10, 15, 16, 22, by E. O., and 10, 12, 13, by E. P. A.